



Alternative 4 - Summary

Habitat Restoration

Emphasis

Increase fish populations through natural production, and reduce entrainment to such an extent that fish take at diversions no longer has a significant effect on fish populations. Improve water supply reliability by reducing the frequency and duration of Endangered Species Act (ESA) constraints on water diversions.

Distinguishing Features

This alternative is intended to provide a low level of resource improvement and conflict resolution.

| Physical/Structural | Operational/Management | Institutional/Policy |
|---|---|--|
| <ul style="list-style-type: none"> Habitat restoration and creation supports fish populations Screens on high priority diversions and salmon bypass at Old River lower fish mortality Base level of levee improvements incorporating habitat restoration reduces system vulnerability Restoration of 750-1,250 acres of tidal wetlands in Suisun Bay improves fish production | <ul style="list-style-type: none"> Real-time monitoring and modified diversion operations reduce fish loss Pollutant source controls to improve water quality | <ul style="list-style-type: none"> Funded levee improvements, emergency management plan, and landside buffer zones to reduce system vulnerability Increased fish populations permit reduction of ESA constraints on diversions |

Benefits

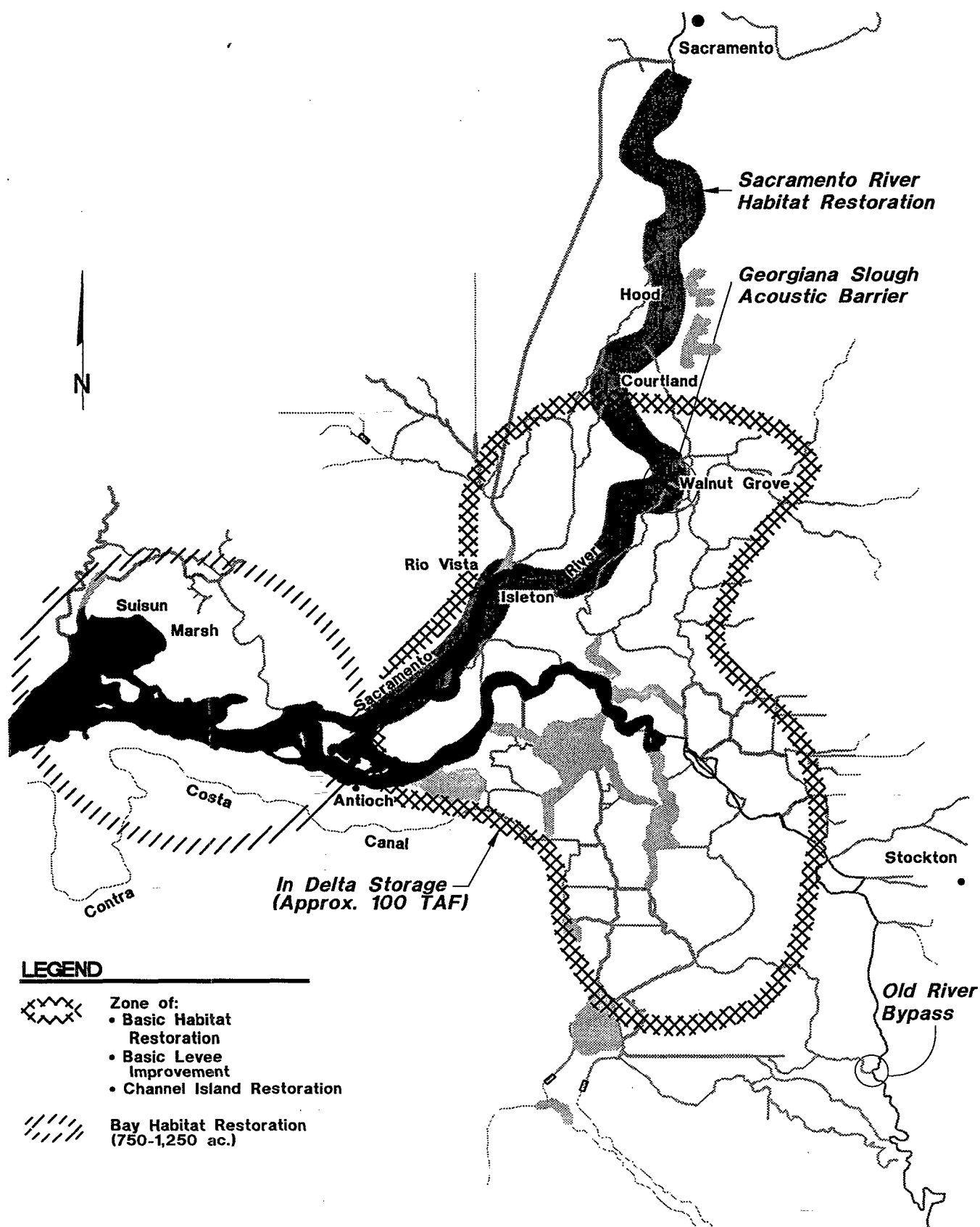
- Improves and enhances habitat to support sustainability of high-interest fish species
- Improves water supply reliability by reducing ESA constraints on diversions
- Reduces vulnerability of Delta functions to catastrophic loss
- Improves Delta water quality

Constraints and Concerns

- Uncertain of the degree to which habitat improvements will reduce diversion constraints
- Uncertain of the length of time required to achieve intended improvements in fish population and water supply reliability

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Overview

This alternative emphasizes increasing fish populations by making habitat improvements. Substantially increased fish populations can reduce the frequency and duration of Endangered Species Act constraints on water diversions, improving supply flexibility and reliability. In addition, the purchase of San Joaquin basin water and new in-Delta island water storage will improve fish transport through the Delta.

Currently, limitations on fish entrainment (take limits) are set to avoid jeopardizing fish populations. When these limits are approached, diversions are curtailed or stopped, creating a high degree of uncertainty for water users. Fish populations are affected by many factors including diversion effects, flow, and other habitat conditions. As habitat is improved, leading to greater fish populations, the effect of diversions on population should be reduced. This should consequently lessen take limit constraints on diversions, providing improved water supply reliability.

Restoration of habitats in the Sacramento River downstream of Sacramento will improve spawning and survival success of fish, while channel features will be restored to provide habitat. In the Delta, restoration of shallow riverine and riparian habitat will provide spawning areas for native fish and increase forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Substantial areas of shallow tidal habitat will be developed in Suisun Bay for wet-year spawning and rearing of Delta smelt and the migratory needs of salmon. New habitat will be constructed along Delta channels. Fish screens and barriers will be installed on highest priority diversions to reduce entrainment effects.

A new water storage facility will be constructed in the Delta, storing water for environmental uses. This facility will be filled through screened diversions when water is available and when fish entrainment can be avoided using real-time monitoring. Water from this facility will be released to improve fish transport conditions in the Delta and to shift the timing of diversions to avoid entrainment.

This alternative provides a basic level of levee improvements to reduce system vulnerability. Levee improvements will also incorporate habitat features. Water quality will be improved by controlling mine drainage entering the Delta.

By linking habitat restoration with levee improvements, this alternative increases fish populations while reducing system vulnerability. The conditions resulting from increased fish populations provide benefits to water supply reliability, predictability, and flexibility. Delta water quality is improved.

improve habitats on Sacramento River and in-Delta to improve fish populations

provides improved water supply reliability

75-125 miles of habitat along levees

750-1,250 acres of tidal wetlands in Suisun Marsh

fish screens on highest priority diversions

100 TAF of new environmental water storage in Delta

basic level of levee protection linked to habitat restoration

Physical and Structural Features

Habitat Restoration

| Activities | Benefits |
|---|--|
| <ul style="list-style-type: none"> Restore riparian, shaded riverine, and shallow water habitat along the Sacramento River channel between Sacramento and Collinsville | <ul style="list-style-type: none"> Provides substantial improvement in aquatic habitat as well as improvements in water supply reliability and water quality Increases survival and spawning success of anadromous and Delta native fish |
| <ul style="list-style-type: none"> Restore Delta and floodway corridor shallow water, riparian, terrestrial, and tidal wetland habitat | <ul style="list-style-type: none"> Provides spawning areas for Delta native fish as well as forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality |
| <ul style="list-style-type: none"> Restore approximately 75 to 125 miles of shallow water, riverine, and riparian habitat along Delta levees | <ul style="list-style-type: none"> Provides spawning areas for Delta native fish as well as forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality |
| <ul style="list-style-type: none"> Protect channel islands from erosion and enhance habitat | <ul style="list-style-type: none"> Provides habitat for aquatic and terrestrial plant and animal species Improves water quality |
| <ul style="list-style-type: none"> Restore about 750 to 1,250 acres of tidal wetlands in Suisun Bay | <ul style="list-style-type: none"> Provides wet-year spawning habitat for Delta smelt, rearing areas for salmon, and wildlife habitat (e.g., canvasback and redhead ducks) |
| Considerations | |
| <ul style="list-style-type: none"> Sacramento River Channel – Feasible and cost-effective habitat restoration implemented between Sacramento and Collinsville. Delta – Candidate areas include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. Candidate areas for Delta levee habitat restoration include Twitchell Island along Threemile Slough, Sevenmile Slough, and the North and South Forks of the Mokelumne River. Floodway Corridors – Habitat restoration must not impair capacity of floodways. Suisun Bay – Convert diked wetlands or create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait. | |

Water Storage

| Activities | Benefits |
|--|---|
| <ul style="list-style-type: none"> Develop about 100,000 AF of new water storage in the Delta dedicated to environmental uses | <ul style="list-style-type: none"> Provides additional diversion flexibility Reduces entrainment of fish Reduces frequency and duration of export curtailments, thus improving water supply reliability Improves fish transport through the Delta Could significantly improve response time (compared to Folsom and Shasta reservoirs) for releasing water for improved management of X2 |
| Considerations | |
| <ul style="list-style-type: none"> Locate new environmentally dedicated Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria. Divert water during November, December, and January; release water from March to July as needed. With real-time monitoring, divert when species of concern are not present and release water to move fish or release for diversion. Environmentally dedicated water storage in the Delta allows reduction in diversions during critical periods. Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional fish and wildlife benefits. | |

Fish Protection and Transport

| Activities | Benefits |
|---|--|
| <ul style="list-style-type: none"> Construct a San Joaquin River bypass at the head of Old River | <ul style="list-style-type: none"> Encourages out-migrating fish to stay in the San Joaquin River Allows for managing flows down Old River |
| <ul style="list-style-type: none"> Install fish screens on highest priority diversions in the Delta, rivers, and tributaries | <ul style="list-style-type: none"> Reduces entrainment of fish |
| <ul style="list-style-type: none"> Improve drainage in floodway corridors | <ul style="list-style-type: none"> Reduces fish stranding |
| Considerations | |
| <ul style="list-style-type: none"> Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. | |

Flood Protection and Levee Stabilization

| Activities | Benefits |
|--|---|
| <ul style="list-style-type: none"> • Provide a basic level of protection and stabilization of Delta levees through levee maintenance and stabilization actions | <ul style="list-style-type: none"> • Manages vulnerability of Delta land use and infrastructure • Manages vulnerability of Delta water supply to salinity intrusion • Manages vulnerability of Delta ecosystem functions • Provides opportunities for habitat restoration |
| <ul style="list-style-type: none"> • Maintain flood conveyance capacity of Delta channels through channel maintenance actions or in conjunction with levee stabilization | <ul style="list-style-type: none"> • Manages vulnerability of Delta functions • Maintains flood conveyance • Provides opportunities for habitat restoration |
| Considerations | |
| <ul style="list-style-type: none"> • Provide flood protection equivalent to Army Corps of Engineers PL 99 standard for these islands: <ul style="list-style-type: none"> Critical western islands with important regional infrastructure (e.g., Highway 160) such as Sherman Island Islands with both valuable habitat and important regional infrastructure (e.g., I-5) such as New Hope Tract • Upgrade all other Delta levees to meet at least the Hazard Mitigation Plan (HMP) standards. • Integrate protection and stabilization of levees with Delta habitat restoration activities. • Provide stable funding mechanism for ongoing levee and habitat monitoring, maintenance, and management. | |

Operational and Management Features**Water Diversion Management**

| Activities | Benefits |
|---|--|
| <ul style="list-style-type: none"> • Improve real-time monitoring for locations of special-concern fish species and modify water diversions to reduce fish entrainment | <ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species • Improves flexibility to divert water during critical fish migration periods |
| <ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control, coordinating operations, and improving fish salvaging and handling | <ul style="list-style-type: none"> • Reduces fish losses |
| <ul style="list-style-type: none"> • Evaluate, improve, and install behavioral barriers for anadromous fish | <ul style="list-style-type: none"> • Diverts anadromous fish from areas of potential entrainment • Allows for continued water diversions at current locations |
| Considerations | |
| <ul style="list-style-type: none"> • Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough. • Evaluate behavioral barriers for Delta Cross Channel and Threemile Slough. | |

Fisheries Management

| Activities | Benefits |
|---|---|
| <ul style="list-style-type: none"> • Mark salmon produced in hatcheries | <ul style="list-style-type: none"> • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries |
| <ul style="list-style-type: none"> • Conduct net-pen rearing of striped bass to supplant natural production | <ul style="list-style-type: none"> • Maintains recreational fishery • Reduces operational constraints on water diversions |
| Considerations | |
| <ul style="list-style-type: none"> • Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. • Need to assess impact of incidental mortality on native (unmarked) fish. | |

Water Quality Management

| Activities | Benefits |
|---|---|
| <ul style="list-style-type: none"> • Implement on-site mine drainage remediation measures based on requirements in current regulations | <ul style="list-style-type: none"> • Improves Delta and Sacramento River water quality |
| Considerations | |
| <ul style="list-style-type: none"> • Identify priority sources and provide regulatory and institutional incentives for implementation. | |

Institutional and Policy Features**Habitat Programs**

| Activities | Benefits |
|--|---|
| <ul style="list-style-type: none"> • Integrate recommended habitat restoration actions from other programs, including CVPIA and the Anadromous Fish Restoration Program | <ul style="list-style-type: none"> • Provides additional habitat restoration |
| <ul style="list-style-type: none"> • Establish programs to preserve agricultural land uses that provide valuable habitat functions | <ul style="list-style-type: none"> • Protects existing habitats |
| <ul style="list-style-type: none"> • Establish a CALFED team to coordinate and expedite habitat restoration permits | <ul style="list-style-type: none"> • Accelerates acquisition of permits for environmental restoration projects and other CALFED projects |
| <ul style="list-style-type: none"> • Establish and fund a management program and rapid response team to manage introduced species | <ul style="list-style-type: none"> • Protects existing valuable species and habitat |
| <ul style="list-style-type: none"> • Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta | <ul style="list-style-type: none"> • Provides materials for habitat and levee improvements |

| Activities | Benefits |
|---|---|
| <ul style="list-style-type: none"> Encourage farmers and levee maintenance districts to leave habitat areas undisturbed by working with resource agencies | <ul style="list-style-type: none"> Protects existing habitats Increases flexibility in maintenance programs |
| Considerations | |
| <ul style="list-style-type: none"> Coordinate activities to avoid duplication of effort. | |

Water Quality Standards

| Activities | Benefits |
|---|--|
| <ul style="list-style-type: none"> Reevaluate Delta export/inflow ratios during triennial reviews as habitat effectiveness is realized | <ul style="list-style-type: none"> Allows for higher level of water transfer as fishery populations improve |
| Considerations | |
| <ul style="list-style-type: none"> Monitor to verify effectiveness of habitat and entrainment reduction programs. Develop an adaptive management program to modify habitat restoration and export/inflow ratios in response to improved sustainability of important species. | |

Management of System Vulnerability

| Activities | Benefits |
|--|--|
| <ul style="list-style-type: none"> Establish and fund an emergency levee management plan to respond to levee failures | <ul style="list-style-type: none"> Provides resources to protect Delta functions through proactive and preventative measures |
| <ul style="list-style-type: none"> Establish landside buffer zones adjacent to levees on islands with deep peat soils | <ul style="list-style-type: none"> Provides increase in stability of Delta levees and reliability of Delta functions by reducing subsidence adjacent to levees Buffer could be used to provide habitat benefit |
| Considerations | |
| <ul style="list-style-type: none"> Determine extent and cost effectiveness of levee management programs and buffer zones. Buffer strip approximately 75 to 100 yards wide dedicated to shallow wetlands. | |

Preliminary Assessment

Benefits

- Improves and enhances habitat to support sustainability of high-interest fish species
- Improves water supply reliability by reducing ESA constraints on diversions
- Reduces vulnerability of Delta functions to catastrophic loss
- Improves Delta water quality

Constraints and Concerns

- Uncertain of the degree to which habitat improvements will reduce diversion constraints
- Uncertain of the length of time required to achieve intended improvements in fish population and water supply reliability